Digital Asset Management: How data can improve asset management

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Key Presentation Take-Aways

- Data is an asset for any transit business

- Digital replica using BIM and GIS

- Conditions monitoring and predictive maintenance practices improvement

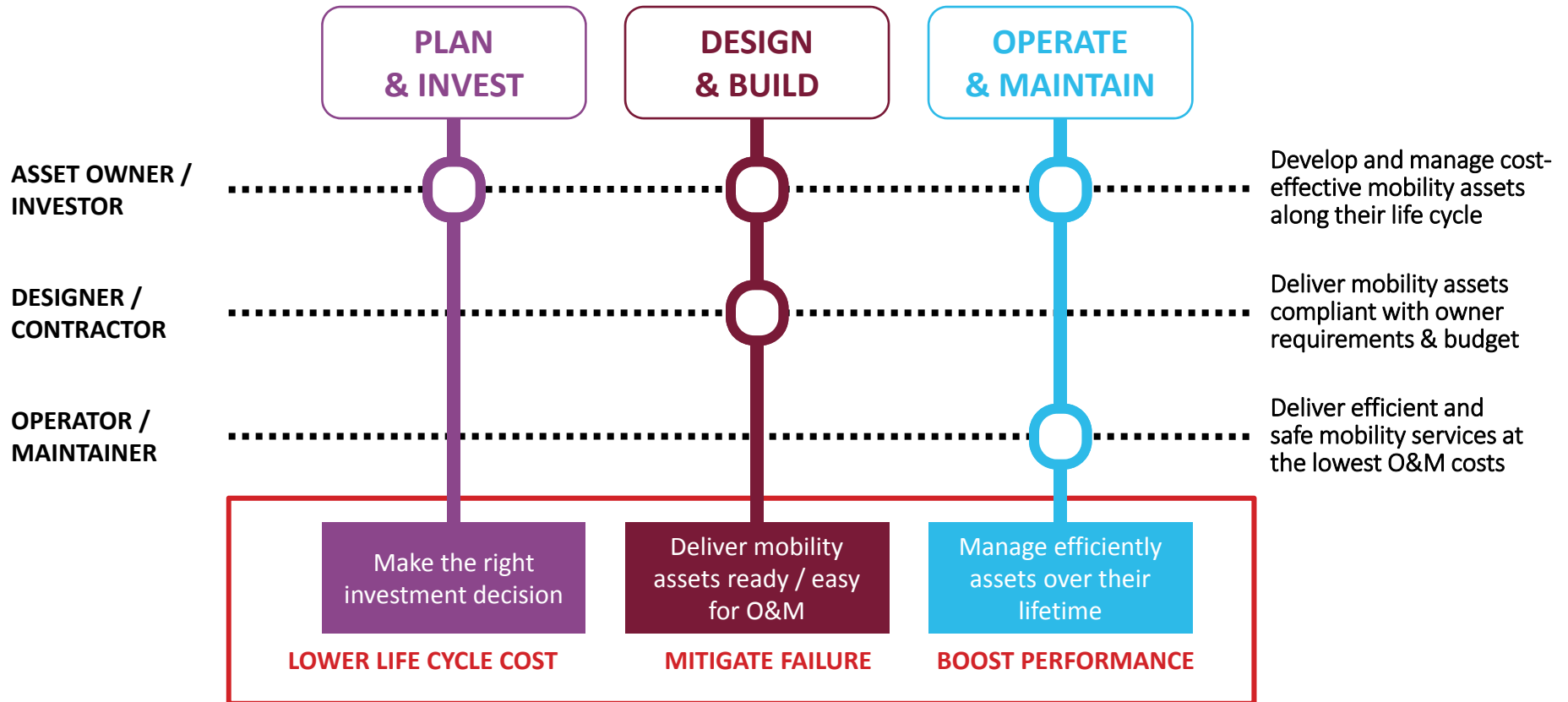- Data analytics to enhance value and performance of assets

Mobility Assets Under Pressure

- Increased mobility needs put existing assets under pressure

- Mobility assets are getting older and costs of maintenance are increasing

Photo: Time Magazine, NYC Subway 1969

Main challenges along asset life cycle

	PLAN & INVEST	DESIGN & BUILD	OPERATE & MAINTAIN	
ASSET OWNER / INVESTOR				Develop and manage cost-effective mobility assets along their life cycle
DESIGNER / CONTRACTOR				Deliver mobility assets compliant with owner requirements & budget
OPERATOR / MAINTAINER				Deliver efficient and safe mobility services at the lowest O&M costs
	Make the right investment decision	Deliver mobility assets ready / easy for O&M	Manage efficiently assets over their lifetime	
	LOWER LIFE CYCLE COST	**MITIGATE FAILURE**	**BOOST PERFORMANCE**	

Asset Management at Operational and Decisional Levels

1. STRATEGY

- Due diligence
- Life Cycle Costs modelling
- Investment strategy
- Renewal strategy
- Maintenance strategy

2. SMART ASSET ENGINEERING

- Maintenance driven design
- Connected assets and remote condition monitoring
- Digital replica (GIS and/or BIM)

3. OPERATIONS & MAINTENANCE

- Maintenance readiness (rules, organization, process, document, training…)
- Maintenance continuous update
- Condition based maintenance

Make the right decision!

Get your asset O&M ready!

Boost your maintenance!

DATA ENGINEERING + CHANGE MANAGEMENT

Make the Right Decisions Early to Tune Your Asset Management Strategy

HOW TO PLAN THE RIGHT ASSET MANAGEMENT STRATEGY?

- Growing mobility needs require assets more and more performant (capacity, availability, reliability...)

- Growing mobility services accelerate assets degradation, gradually impacting O&M costs, performance and safety

- Budgets are more and more restricted (in terms of Capex and Opex)
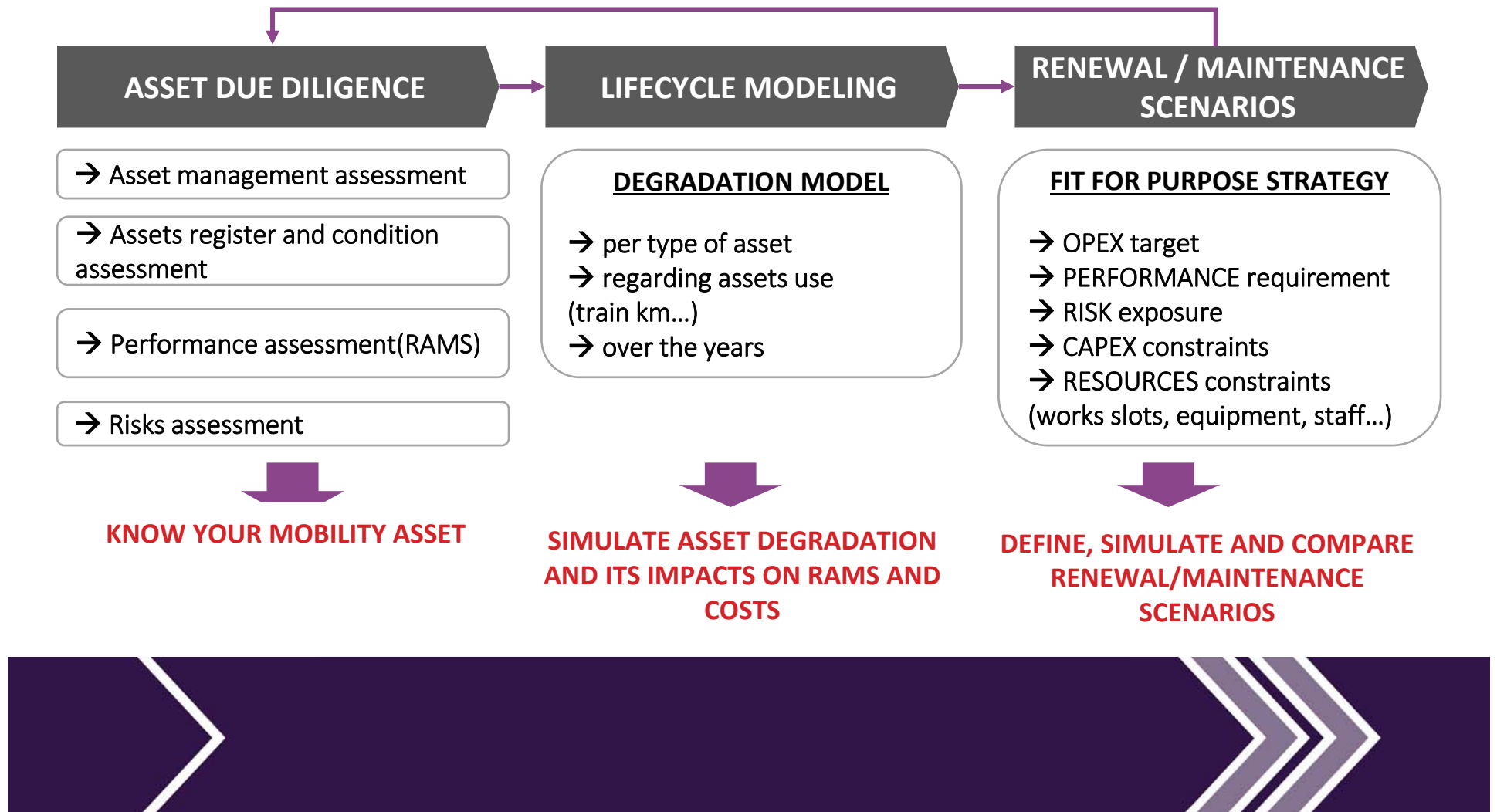
LEVERAGE DATA TO INFORM YOUR DECISION MAKING

- To plan and draft cost-efficient and attractive mobility asset

- To simulate and compare design specification based on your asset management strategy using **BIM**

- Renewal / Maintenance decision support tool

Fit Your Renewal / Maintenance Strategy with Resource Constraints and Business Objectives

ASSET DUE DILIGENCE

→ Asset management assessment

→ Assets register and condition assessment

→ Performance assessment(RAMS)

→ Risks assessment

KNOW YOUR MOBILITY ASSET

LIFECYCLE MODELING

DEGRADATION MODEL

→ per type of asset
→ regarding assets use (train km...)
→ over the years

SIMULATE ASSET DEGRADATION AND ITS IMPACTS ON RAMS AND COSTS

RENEWAL / MAINTENANCE SCENARIOS

FIT FOR PURPOSE STRATEGY

→ OPEX target
→ PERFORMANCE requirement
→ RISK exposure
→ CAPEX constraints
→ RESOURCES constraints
(works slots, equipment, staff...)

DEFINE, SIMULATE AND COMPARE RENEWAL/MAINTENANCE SCENARIOS

Fit Your Renewal / Maintenance Strategy with Resource Constraints and Business Objectives

- Assess asset condition

- Simulate asset degradation

- Compare asset management strategy
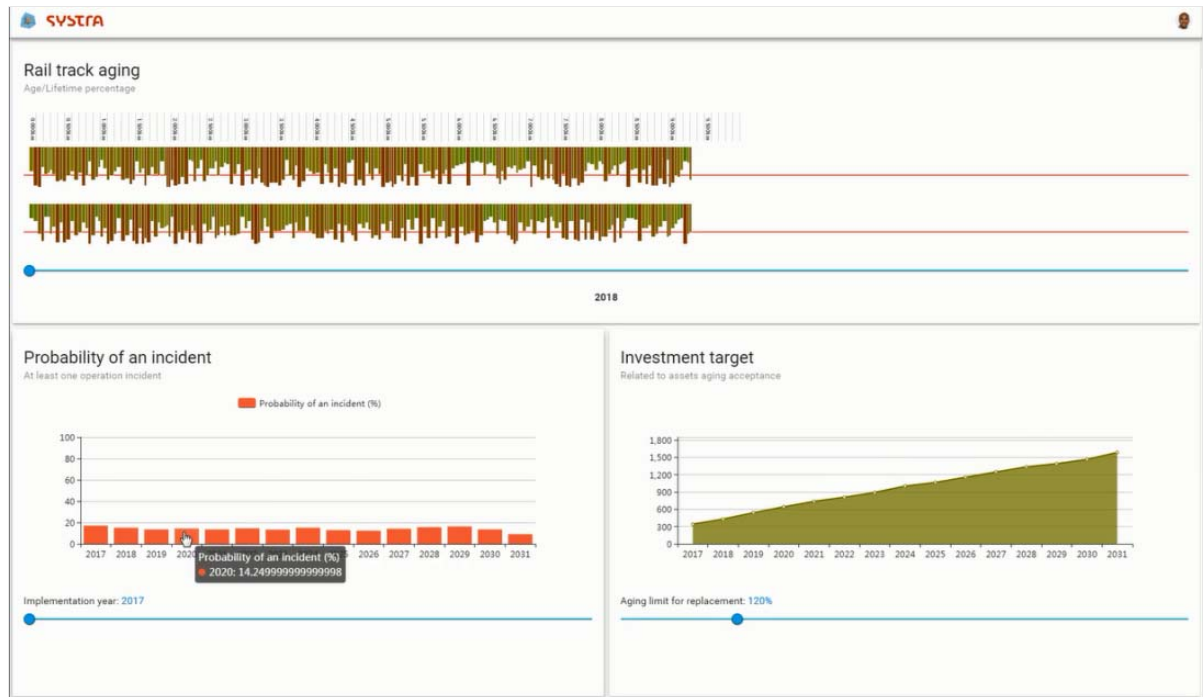
Get Assets Ready for O&M from Design and Construction Phases

HOW TO GET ASSETS READY FOR O&M?

- Contractors (delivery of assets) and operators (management of assets) don't have the same business objectives

- Handover of asset information from contractors to the operator takes place late in the process and is very time-consuming

LEVERAGE SMART & COLLABORATIVE DESIGN WITH

- Maintenance driven design

- **Digital replica (GIS and/or BIM)**

- Connected assets and remote condition monitoring

Get Physical Assets Ready for O&M with Maintenance-Driven Design

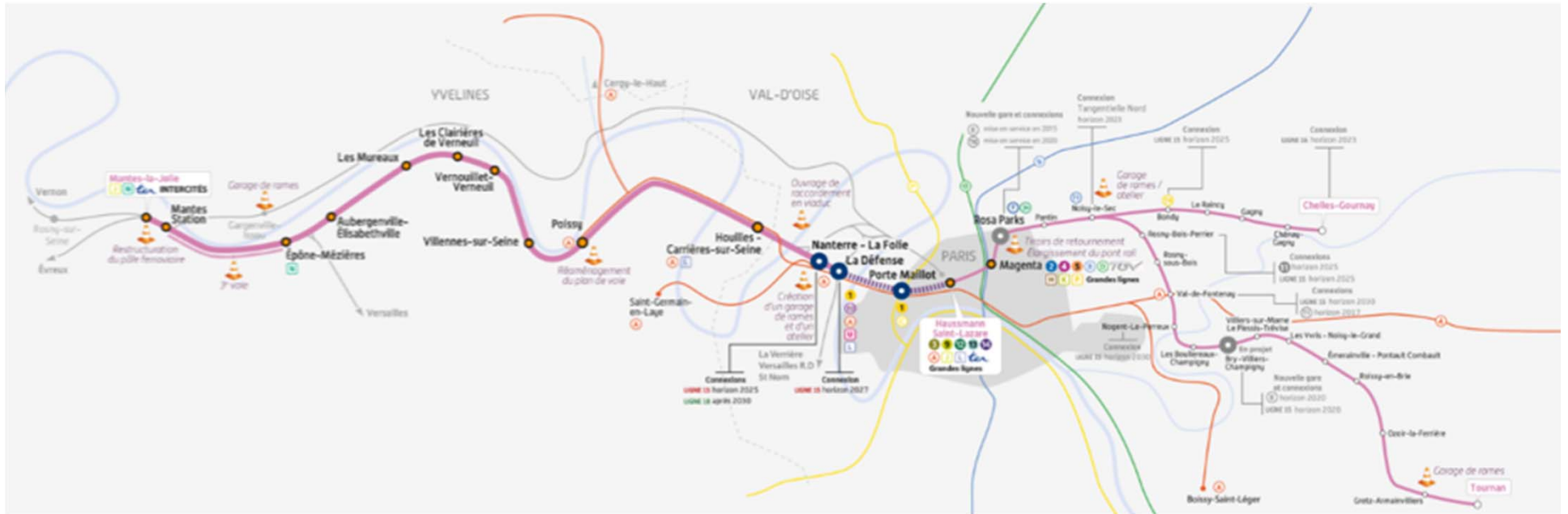**MAINTENANCE DRIVEN DESIGN OF A BRIDGE EASY TO INSPECT**

- A monitoring system able to inspect bridge along adjacent track still in operation at 320 km/h

- Maintenance requirement was specified at early stage

Get Digital Assets Ready Structuring Data with a GIS or BIM Model

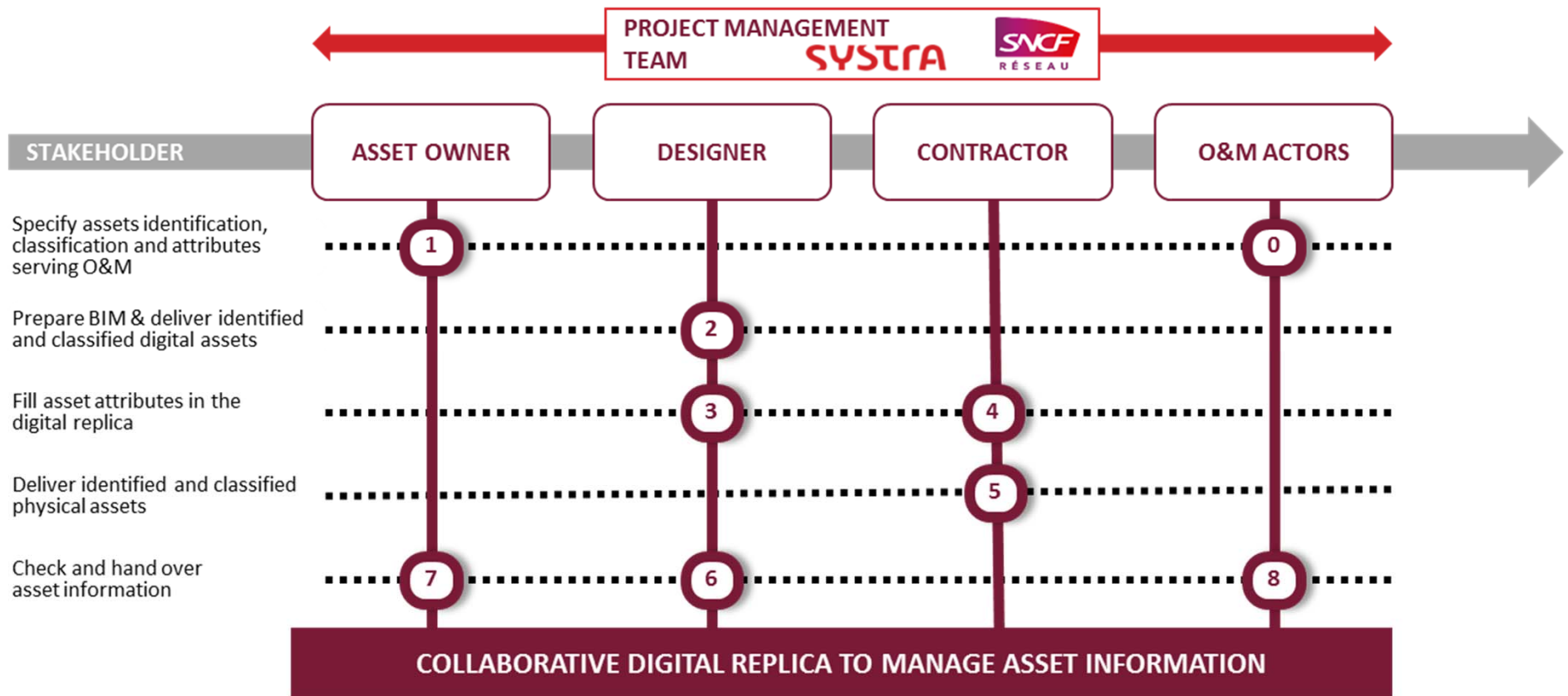# Get Digital Assets Ready Structuring Data with a GIS or BIM Model

BUSINESS CASE – EOLE PROJECT

40 miles — **0,6 Mpax** — **4 Bn$**

# Get Digital Assets Ready Structuring Data with a GIS or BIM Model

Get Digital Assets Ready Structuring Data with a GIS or BIM Model

Assets	Quantity
Switches	3 299
Building	1 511
Catenary	15 479
Power Supply	971
Civil	4 421
Signaling	44 730
Telecom	24
Track	877
TOTAL	71 313

ASSETS CLASSIFICATION
SERVING MAINTENANCE USE

AIGUILLES	3299
ADVS_BM	518
ADVS_PCV	1152
ADVS_PCVE	1098
ADVS_RACCOS	531

SWITCHES
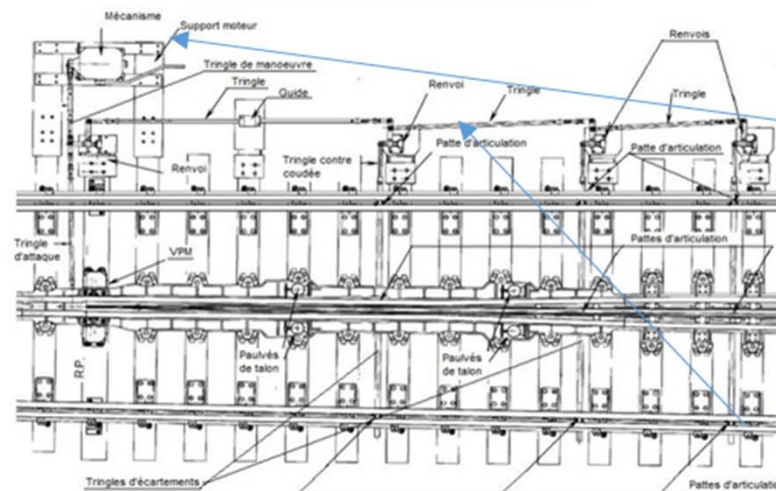
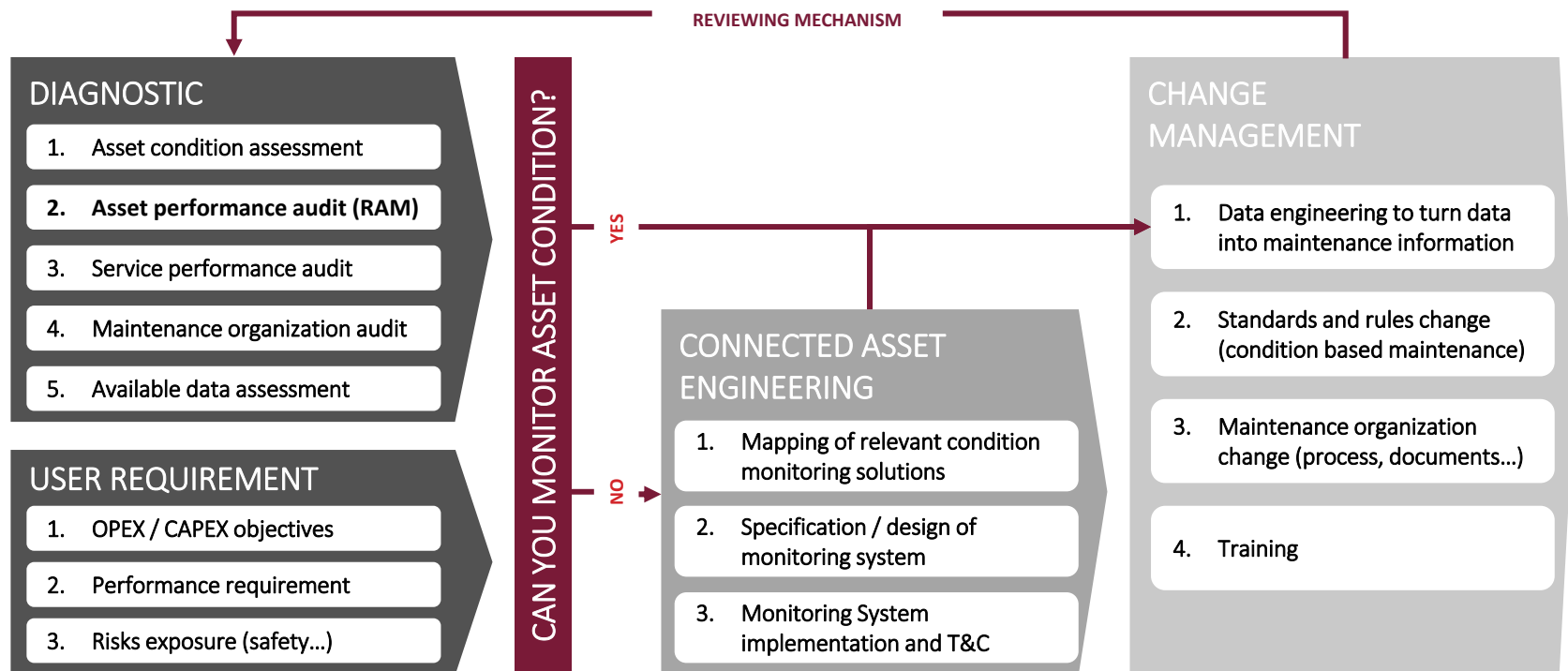| ADVS_PCV	1152
1/2 ferrure droite	32
1/2 ferrure gauche	32
Appareil de voie	32
armoire ARAG	32
armoire SRE aiguille (PM)	32
Cœur	32
commutateur à clé S aiguille (PF)	32
Contrôleur Paulvé 1/2 Aig. N°1 File Droite	32
Contrôleur Paulvé 1/2 Aig. N°1 File Gauche	32
Contrôleur Paulvé 1/2 Aig. N°2 File Droite	32
Contrôleur Paulvé 1/2 Aig. N°2 File Gauche	32
Contrôleur Paulvé 1/2 Aig. N°3 File Droite	32
Contrôleur Paulvé 1/2 Aig. N°3 File Gauche	32
Contrôleur Paulvé 1/2 Aig. N°4 File Droite	32
Contrôleur Paulvé 1/2 Aig. N°4 File Gauche	32
Contrôleur Paulvé Coeur N°1 Droite	32
Contrôleur Paulvé Coeur N°1 Gauche	32
Contrôleur Paulvé Coeur N°2 Droite	32
Contrôleur Paulvé Coeur N°2 Gauche	32
JIC	32
Moteur aiguille (PM)	32
Moteur Coeur (PM)	32
Report polarité (PM)	32
Résistance moteur aiguille (PM)	32
Résistance moteur Coeur (PM)	32
Resistance rechauffage lame aiguille (PM)	32
Resistance rechauffage lame Coeur (PM)	32
Resistance rechauffage VCC aiguille (PM)	32
Resistance rechauffage VCC Coeur (PM)	32
Sonde température aiguille (PM)	32
Survaig (PM)	32
Tringlerie de commande (PM)	32
VCC 1/2 Aig. Droite	32
VCC 1/2 Aig. Gauche	32
Verrou Pointe Mobile Droite	64

Get Assets Ready for O&M with Remote Condition Monitoring

- Asset condition monitoring is not about big data but relevant maintenance information

- Start valuing existing data before collecting more!

- (If required) Specify fit for purpose monitoring system so as to collect few but relevant data to turn into valuable information for maintenance
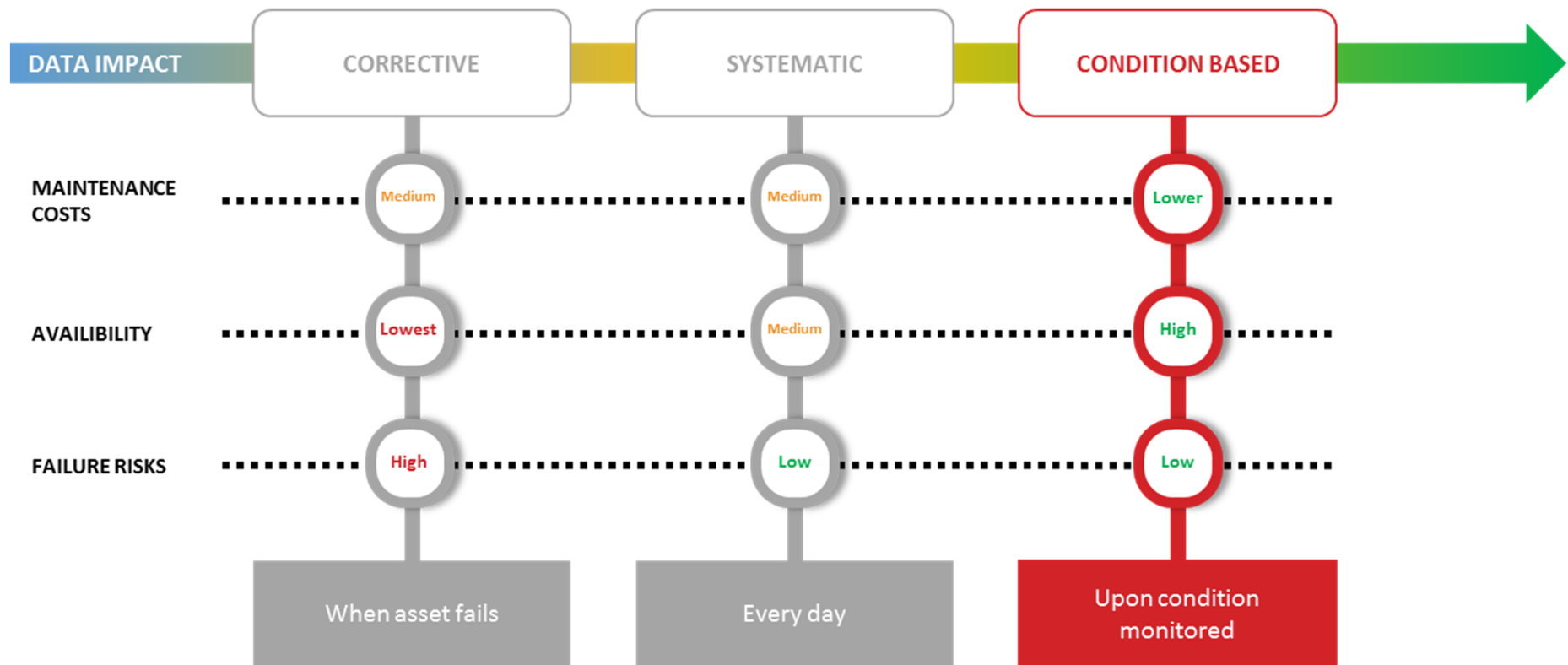

Asset monitoring and control

Get Assets Ready for O&M with Remote Condition Monitoring

REVIEWING MECHANISM

DIAGNOSTIC

1. Asset condition assessment
2. **Asset performance audit (RAM)**
3. Service performance audit
4. Maintenance organization audit
5. Available data assessment

USER REQUIREMENT

1. OPEX / CAPEX objectives
2. Performance requirement
3. Risks exposure (safety…)

CAN YOU MONITOR ASSET CONDITION?

YES

NO

CONNECTED ASSET ENGINEERING

1. Mapping of relevant condition monitoring solutions
2. Specification / design of monitoring system
3. Monitoring System implementation and T&C

CHANGE MANAGEMENT

1. Data engineering to turn data into maintenance information
2. Standards and rules change (condition based maintenance)
3. Maintenance organization change (process, documents…)
4. Training

Condition-Based Asset Monitoring for a cost Efficient Maintenance Regime

Digital Replica Concept
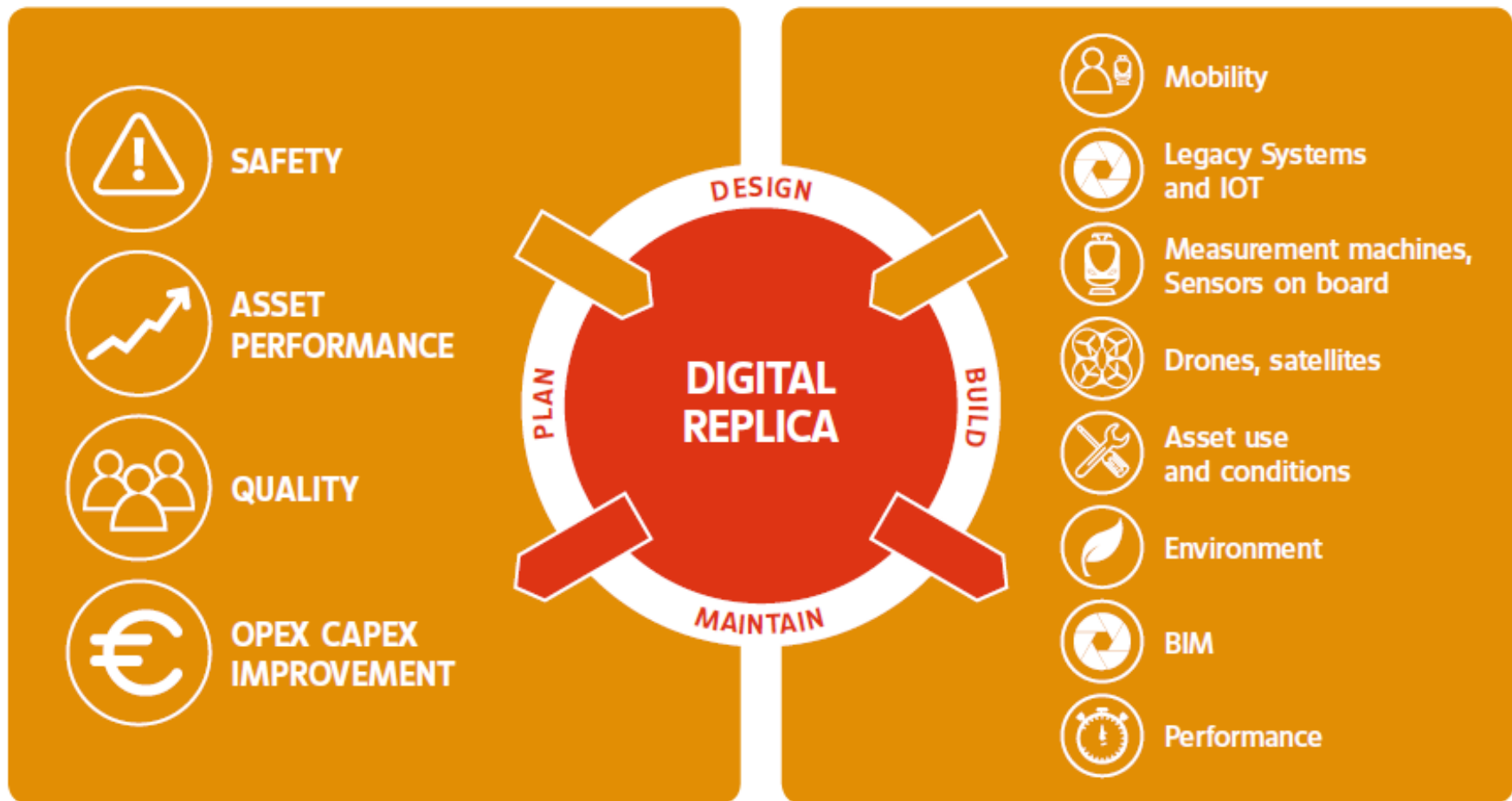
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For More Information:

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